torical ancestors of our common house-dog. The author, who studied the subject for eleven years, arrived at the conclusion that neither wolves nor foxes had any part in the phylogeny of the dog, but that jackals and the so-called Indian wolf, *Canis pallipes*, Sykes, were the original ancestors of *Canis familiaris*.

THE first volume of the *Annals* of the Royal Belgian Museum of Natural History contains the first part of Van Beneden's work, "Description des Ossements fossiles des environs d'Anvers," which deals with the Pinnipeds, and is illustrated by fourteen engraved plates.

THE additions to the Zoological Society's Gardens during the past week include a Grivet Monkey (*Cercopithecus griseo-viridis*) from West Africa, presented by Mr. R. Dudgeon; a Lion (*Felis leo*) from Persia, presented by Mr. F. Pollock; a Common Seal (*Phoca vitulina*) from the British seas, presented by Mr. G. Mellin; a Great Kangaroo (*Macropus giganteus*) from New South Wales, presented by Mr. T. Phillips; a Collared Peccary (*Dicotyles tajaçu*) from South America, presented by Mrs. E. J. Barrett; two Emus (*Dromæus novæ-hollandiæ*) from Australia, presented by Lord Francis Conyngham, M.P., F.Z.S.; two Peregrine Falcons (*Falco perigrinus*), European, presented by Mr. Darill Stephens; a Black-headed Partridge (*Caccabis melanocephala*) from Hedgar, a Hyacinthine Porphyris (*Porphyrio hyacinthinus*) from Mesopotamia, presented by Capt. Burke, S.S. *Arcot*; a Vervet Monkey (*Cercopithecus lalandii*) from South Africa, an Arabian Gazelle (*Gazella arabica*) from Arabia, deposited.

AMERICAN SCIENCE

IN the last number of the *American Journal* Mr. Charles Wachsmuth continues his notes on the internal and external structure of palæozoic corals, and discusses the construction of the summit and its value in classification. He believes that while the construction of the ventral disc or actinal side of the calyx has not received the attention it deserves, it affords a clear and important distinction between recent and ancient crinoids. Commenting on Rœmer's classification of "the true crinoids which are supported by an articulated or jointed column" given in *Lethæa geognostica*, 1855, Mr. Wachsmuth says he expects from a dissection of *Synbathocrinus* that in other of the Cupressocrinidæ the central opening was closed, and that the consolidating plates were further overlaid with plates forming the floor of a passage in connection with the arm furrows and visceral cavity. In speaking of the Cyathocrinidæ he refers to the covering of Cyathocrinus, as throwing light on the summit structure of other genera, and remarks: "It is worthy of note that the Cyathocrinidæ, in the structure of their vault, bear closer resemblance to the recent crinoids than almost any other group, and seem to hold an intermediate position between modern and palæozoic types. The Cupressocrinidæ and Cyathocrinidæ thus fall naturally into a group by themselves, having the vault supported by consolidating plates and covered by an immovable arch of small plates." In the Taxocrinidæ Mr. Wachsmuth has found that there are solid plates, though they have been before described as covered by some soft material. Among the spheroidæ, which range from the silurian to the subcarboniferous, the summit is found well preserved in most genera. Besides details of obsevations some generalisations are added. "Closely related as the recent crinoids are to their palæozoic ancestors in some points, the solid vault of the latter cannot in the remotest degree be homologised with the soft peristome of the former." Many facts tend to prove that the palæozoic crinoids embracing therein all true crinoids in which the actinal side is closed, represent the young stage of growth of living types. They form a distinct group of crinoids, and it is proposed to call these paleocrinoideæ.

Prof. Draper advocates the use of the cylinders of zirconia for the oxyhydrogen light in such cases as the employment of the microscope to throw objects on a screen for lecture demonstrations. A high brilliancy with the least variability in the light, and a fixity of its position in the optical axis of the apparatus, are needed for success. Prof. Draper gives his reasons for believing that the oxy-zirconium light fulfils all requirements better than any other known light. "It has the intrinsic brilliancy, the invariable brilliancy, the fixity of position in the optical axis of the apparatus, and it does not volatilise under the heat employed. The condensing lenses remain free from deposit, and after the light is once adjusted the experimenter can carry on his demonstrations without the distraction of his attention that attends the use of the other lights." He gives direction for the preparation of zirconium oxide, and for the preparation of the cylinders.

Mrs. M. S. Cheney and Mrs. Ellen S. Richards, dating from the women's laboratory, Massachusetts Institute, describe a new and ready method for the estimation of nickel in pyrrohotites and mattes.

Prof. J. D. Dana is publishing his conclusions as to the relations of Vermont and Berkshire geology, and Ed. S. Dana has recently described garnets from the trap of New Haven.

Mr. G. B. Grinnell, who has devoted attention to the annelids of the Cincinnati group, describes a new genus from the Lower Silurian. They have hitherto been inferred from their trails, and the hard chitinous parts now found do not seem to belong to any recognised genus.

Mr. Joseph Le Conte, criticising Dr. Hermann's paper on "The Passage of Luminous Pencils obliquely through Lenses and on a Related Property of the Crystalline Lens of the Human Eye," points out that the periscopic structure of the lens is useless, because periscope perception of the retina is wanting. It must be regarded as an example of a structure which has outlived its usefulness.

Prof. O. C. Marsh (in the Appendix to the September number of the *American Journal*) describes new fossil mammals, birds, reptiles, and fishes, from the Rocky Mountain region. Among the mammals are two miocene edentates, the first detected in the country, and a third species from the lower pliocene. The names of the new species are *Moropus distans*, *Moropus senex*, *Moropus elatus*, *Amynodon* (gen.), *Tapiravus rarus*, *Bison ferox*, *Allomys nitens*, *Graculavus lentus* (a bird the size of a duck), *Diplosaurus felix*, *Crocodilus solaris*, *Nanosaurus agilis* (a dinosaur no larger than a cat), *Nanosaurus victor*, *Apatodon mirus*, *Heliobatus radians*.

We have already referred to an important exploration of the natural history and ethnology of the West Indies, now in course of prosecution by Frederick A. Ober, under the auspices of the Smithsonian Institution. Some interesting collections of specimens have already been received at Washington from Mr. Ober, embracing particularly a series of the birds of the island of Dominica, including several species new to science, and others of excessive rarity. Among the latter is a huge parrot, one of the largest of its genus. The latest advices from Mr. Ober are dated Antigua, August 6. He was then about proceeding to St. Kitts, and thence through the chain of English islands to Granada, including the Dutch islands of Saba and Eustatius. The region to be explored by him extends over six degrees of latitude, and will occupy him at least two years. Not the least important results of Mr. Ober's work have been the studies made during a long residence among the Carib tribe of Dominica. He has been able to secure numerous photographs of this little-known people, and many illustrations of their manners and customs, all of which will be hereafter the subject of a popular article for some one of our leading journals.

The Kansas University scientific expedition of 1877 has found a number of a very rare species of beetle of the genus *Amblychila*, the acquisition of which has long been an object by collectors of coleoptera. For the purpose of securing funds to defray the expenses of their explorations, the authorities of the university offer specimens for sale at a moderate price.

A precious limestone has been found at Tehachepa, Kern County, California, which is said to be identical with the "giallo antico" (ancient yellow) marble of Italy. The latter is highly prized by antiquarians, as the location of the quarry from which it was procured has been unknown for several centuries. The California stone is described as white with amber-coloured veins. A specimen has been presented to the State Geological Society.

Mr. Edward Bicknell, a gentleman well known among American microscopists, died on March 19, at Lynn, Massachusetts, at the age of forty-seven. Originally a resident of Salem, he joined the scientific corps of workers at the Museum of Comparative Zoology in Cambridge, with which he was connected until the death of Prof. Agassiz. His sections of shells and rocks were of extraordinary beauty, and he was also specially skilled in the preparation of injected objects.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

OXFORD.—The Oxford University Commissioners will sit for a fortnight at Oxford, from the 22nd of this month. They will occupy rooms at the Clarendon Hotel, the University being unable to place sufficient accommodation at their disposal. It is understood that evidence will be received during this sitting as to the requirements of the University. The *Academy* states that it is rumoured that the Oxford University Commissioners propose to devote the first year to taking evidence; they will then lay down principles, and, lastly, will receive and adjudicate upon the schemes of the various colleges.

CAMBRIDGE.—Mr. William James Sell, B.A., Scholar of Christ's College, has been appointed joint demonstrator of Chemistry in the University in conjunction with Mr. Hicks.

Mr. J. Aiken, of Liverpool, who a few years ago gave a donation of 1,000*l*. to the Association for the Higher Education of Women at Cambridge, has signified his intention of placing at the disposal of the Association an exhibition of 30*l*. for two years.

MANCHESTER.—The session of the Owens College was opened on Tuesday, the 2nd inst., with an introductory address by Prof. Williamson, F.R.S., on the present aspect of the evolution theory. So far as can yet be judged the attendance of students promises to be very good during the session.

IRELAND.—The thirteenth annual meeting of the Convocation of the Queen's University in Ireland was held on October 5 in Dublin Castle, under the presidency of Sir Dominic Corrigan, Vice-Chancellor. The annual report referred to the great necessity that now was manifested for the supply of central buildings for the University in the Irish metropolis. The report was unanimously adopted, and it was urged by the speakers that a representation should be made to the Government for a grant in aid of the erection of necessary buildings. A motion in favour of the admission of women as medical students to the colleges of the University was lost.

GLASGOW.—It is stated that Dr. Cleland, of Galway, has been appointed to the Chair of Anatomy in Glasgow University, recently vacated by Dr. Allen Thomson.

Mr. A. Orr Ewing, M.P. for Dumbartonshire, has announced his attention of founding, in connection with the Glasgow University, four bursaries of 25*l*. per annum each, tenable for four years. Mr. Orr Ewing expressly declares this to be an experiment to test the working and results of the bursary system before resolving upon a permanent endowment. To this end he has decided to place the sum of 1,600*l*., payable in seven annual instalments, at the disposal of the Senatus.

SOCIETIES AND ACADEMIES

PARIS

Academy of Sciences, October 1.—M. Peligot in the chair.—The following papers were read:—On the order of appearance of the first vessels in the shoots of Lysimachia and of Ruta, by M. Trécul.—Reply to M. Angot's last note on the system of winds in the region of the Algerian chotts, by M. Roudaire.—Boric acid; methods of investigation; origin and mode of formation, by M. Dieulafait. *Inter alia*, he considers (in opposition to some high authorities) that the boric acid and accompanying substances in the *lagoni* of Tuscany and in analogous beds, are (with exception of the carbonic acid) products exclusively sedimentary, their mode of formation being fully explained from a study of the mother-waters of salt-marshes. It is unnecessary to call in any volcanic action. Boric acid seems to have existed in seas from the earliest ages, and to have been deposited wherever portions of sea got separated under suitable conditions. This occurred on an immense scale at two epochs widely apart, viz., in the trias, and at a certain horizon of the tertiary formation. It is in the *last* mother-waters of salt-marshes that boric acid is concentrated.—Employment of pyritous earths for treatment of phylloxerised vines, by M. Dufresnoy.—Integrals of oblique developers of any order, by Abbé Aoust.—Discovery of oxygen in the sun, and new theory of the solar spectrum, by Prof. Draper.—Note on the magnetisation of tubes of steel, by M. Gaugain. If a neutral cylindrical bar of steel, at ordinary temperature, be introduced into a magnetised tube of steel and withdrawn after a few seconds, it will be found weakly magnetised in the same sense as the tube. But if, after insertion, the system be heated with a lamp to about 300 deg., allowed to cool, and the core then drawn from the tube, the tube will be found to have lost a large part of its original magnetism, and the core to have taken an inverse magnetism.—On the exact measurement of the heat of solution of sulphuric acid in water, by M. Croullebois. The hitherto divergent results are attributed to a fact observed by M. Kirchhoff, viz., that the thermal effect is intimately connected with the tension of aqueous vapours emitted by the solution, and consequently with the temperature. Taking this into account the author gives a table of calories corresponding to different temperatures from 10° to 24°.—Continuation of researches on the effects of electric currents of high tension, and their analogies to natural phenomena, by M. Planté. This relates to effects had on placing the positive electrode of a battery of 800 secondary couples in distilled water, and bringing the negative platinum wire near the surface, a column of water having been inserted in the circuit to obviate fusion. A small globe of fire appears, taking an ovoid form when the electrode is raised a little, while a number of blue luminous points in concentric circles are seen at the surface of the water. Rays presently start from the centre and join the points; they go into gyration in one direction or the other, and describe spirals; sometimes they disappear on one side. Lastly, with increased velocity of gyration, all vanish, and only the blue concentric rings are left. The experiment bears on the formation of globular lightning.—Some new researches on the metal davyum, by M. Kern. New researches on the density confirm the former. From preliminary experiments the equivalent is shown to be greater than 100, and probably near 150-154.—New modes of formation of oxide of ethylene, by M. Greene.—Note on the wire-drawing of platinum, by M. Gaiffe. He has got stronger fine wire by excluding atmospheric dust more completely.—On the fecundation of echinoderms (continued), by M. Fol.—Metamorphoses of cantharides (*Cantharis vesicatoria*), by M. Lichtenstein.—On the mutual antagonism of atropine and muscarine, by M. Prevost. He asserts (contrary to some) that large doses of muscarine will produce toxical effects in animals previously atropinised.—Trajectory of the bolide of June 14, 1877, by M. Gruey.—Meteorological observations in a balloon, by MM. Tissandier. They found a layer of air 400 m. thick, at a height of 400 m., moving pretty rapidly between two other layers almost motionless; a rare phenomenon.—On a halo observed at Brest on August 31, 1877, by M. Salicis.—Reflections on the meteorological works of M. Brault, by M. Buys-Ballot.

CONTENTS

PAGE
FLEISCHER'S "VOLUMETRIC ANALYSIS" 497
HARTLAUB'S BIRDS OF MADAGASCAR 498
OUR BOOK SHELF:—
Edgeworth's "Pollen" 499
Moebius's "Die Auster und die Austernwirthschaft" 499
Mayr's "Die Naturkräfte.—Die Gesetzmäszigkeit im Gesell-Schaftsleben" 500
LETTERS TO THE EDITOR:—
Potential Energy.—P. M. 500
Indications of the Ice-Age in Shetland.—G. G. 501
The Discoverer of Photography.—J. SMITH 501
The Portrait of Tycho Brahe.—Dr. SAMUEL CROMPTON 501
Lumière Cendrée.—B. G. JENKINS 502
Lightning Conductors.—JOHN PERRY; W. E. AYRTON 502
Electric Lighting.—J. MUNRO 502
Caterpillars.—J. A. OSBORNE 502
The Satellites of Mars.—JOHN BRETT 503
Rate of Mound-Building.—Dr. OTIS T. MASON 503
OUR ASTRONOMICAL COLUMN:—
The Melbourne Observatory 503
The Outer Satellite of Mars 504
The Near Approach of Saturn and Mars, November 3 504
New Comet 504
BIOLOGICAL NOTES 504
SOLAR RADIATION AND SUN-SPOTS. By S. A. HILL 505
FERTILISATION OF FLOWERS BY INSECTS, XVII. By Dr. HERMANN MÜLLER (*With Illustrations*) 507
THE RESTORATION OF THE ANCIENT SYSTEM OF TANK IRRIGATION IN CEYLON. By the Rev. R. ABBAY 509
NOTES 512
AMERICAN SCIENCE 514
UNIVERSITY AND EDUCATIONAL INTELLIGENCE 516
SOCIETIES AND ACADEMIES 516

© 1877 Nature Publishing Group